EVALUATION OF DATA UTILITY FOR EARTH SCIENCES FROM METHODICAL POINT OF VIEW

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15. Abstract

Surveying terminal moraines in western Sweden and southeastern Norway.

A very distinct line representing the Ra-substage of the last deglaciation period is observable around the outer parts of the Oslo fjord. The moraine line is also traceable in some parts of the forest district on the Swedish side of the border forming part of the Central Swedish End Moraines. In the area of Lake Vänern to the southeast, the line is then again more distinct, partly due to the cultivation pattern. Outside the Central Swedish Moraine Line and nearer to the coast another not so distinct moraine line could be observed running NNW-SSE. This line crosses the coastline before reaching the Oslo fjord. Probably the moraine deposits on some outer islands in the fjord constitute part of this older moraine line.

The study will be extended to districts of southern Sweden, where old moraine lines of the last deglaciation period are incompletely mapped.

a. Title: EVALUATION OF DATA UTILITY FOR EARTH SCIENCES FROM METHODICAL POINT OF VIEW

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b. GSFC ID No. of P.I. : Fo 426

c. Statement and explanation of any problems that are impeding the progress of the investigation:

Because of bad weather conditions during the ERTS-1 passages only sparse and not very adequate data from our test areas were received before March 1973. From early spring and during the summer very fine imagery is however received.

d. Accomplishments during the reporting period and those planned for the next reporting period:

During the reporting period the following studies were accomplished:

1. Analysis of borderline changes and bottom registration in a coastal area in South Sweden. (Report in preparation.)
2. Surveying terminal moraines in western Sweden and southeastern Norway in ERTS-1 imagery. (Report enclosed.)

For the next reporting period the following studies have started:

1. Cloud structure and cloud patterns observed in ERTS-1 imagery.
2. Mapping of the break-up of ice in lakes.
3. Structural patterns in an area of poor geological mapping in southwestern Sweden.
4. The potential use of ERTS-1 images for detecting current patterns in the Baltic.

e. Discussion of significant results and their relationship to practical applications or operational problems:

See report enclosed.

f. Listing of published articles, and/or papers, preprints and in-house reports that were released during the reporting period:

1. Svensson,H., Randmoräner i ERTS-1 bilder. Geologiska föreningen i Stockholm förhandlingar. Vol. 95:1. 1973.

2. Svensson,H., Multispektral avbildning från ERTS-1. Geografiska notiser. Årg. 31:3. 1973.

3. Nordström,Siw, Avbildning av kustlinje och djupförhållanden vid Falsterbohalvön. In-house report.

SURVEYING TERMINAL MORAINES IN WESTERN SWEDEN AND SOUTHEASTERN NORWAY IN ERTS-1 IMAGERY

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Abstract

A very distinct line representing the Ra-substage of the last deglaciation period is observable around the outer parts of the Oslo fjord. The moraine line is also traceable in some parts of the forest district on the Swedish side of the border forming part of the Central Swedish End Moraines. In the area of Lake Vänern to the southeast, the line is then again more distinct, partly due to the cultivation pattern. Outside the Central Swedish Moraine Line and nearer to the coast another not so distinct moraine line could be observed running NNW-SSE. This line crosses the coastline before reaching the Oslo fjord. Probably the moraine deposits on some outer islands in the fjord constitute part of this older moraine line. - The study will be extended to districts of southern Sweden, where old moraine lines of the last deglaciation period are incompletely mapped.

Introduction

In a study of the potential use of ERTS-1 multispectral data for detecting surficial deposits and land forms of the Quaternary period, ERTS-images of a coastal district of Sweden bordering the southeastern part of Norway were analyzed. The scene, 1043-09574, is of September 4th 1972. +9.5 and 9.5 paper prints of the four MSS-bands were used.

The area surveyed is part of the Archean gneiss-granite area in southwestern Sweden. In the outer western part of the Oslo fjord Permian igneous bedrock occurs. Dissected, outcropping bedrock makes up vast areas of the district, especially in the coastal

part. The terrain is characterized by frequent structural lineaments causing elongated lakes or valleys with glacial or marine sediments, deposited in late-glacial time. The marine limit of the last glaciation rises from 100 m a.s.l. in the southern part of the area to 170 m a.s.l. at the Norwegian border. Large areas inside the coastal zone are covered by forest.

The Ra-Central Swedish End Moraines

In the outer part of the Oslo fjord a very distinct line is observable on both sides of the present fjord area. The lines are not connected with the present coastline and converge in their northern parts towards the inner part of the fjord.

The lines constitute a part of the well-known Ra-endmoraine of the last deglaciation period. Across the Oslo fjord the ice margin was broken by a large estuary which is distinctly recorded in the ERTS-image by the converging moraines.

The distinctness of the moraine line is partly due to the land use pattern. The frequency of small lakes is also differentiated by the moraine line. Especially in the eastern part of the fjord, lakes are more frequent inside than outside the line.

From the Oslo fjord area the moraine line is not so emergent to the southeast in the lake and forest district west of Lake Vänern. In the cultivated area at this lake as also in some features of the shore line of this great lake the line is again traceable forming part of the Central Swedish End Moraines.

Moraine lines in the northern part of the Swedish west coast

Older than the Ra-Central Swedish End Moraines of the Younger

Dryas phase of the deglaciation are the moraine lines situated along the Swedish west coast. One of these lines is the Gothenburg moraine or the Moslätt/Berghem moraine line. From the lower, partly cloud-covered part of the image this line can be observed in the cultivation pattern. Glacial deposits (sediments) partly fill the valleys of the fractured landscape and define the line.

In the northern direction the line is crossing the inner parts of small fjords. The recording of the line is growing fainter in its northwestern parts before it crosses obliquely the coastline and disappears. Probably the submarine continuation of the moraine line has connection with the moraine deposits in the outermost parts of the Oslo fjord area.

Conclusions and further approach

To get a general survey of extended moraine deposits ERTS-1 imagery has turned out to be an adequate tool. After having analyzed ERTS images and gained experience of this material for well-known moraine lines, ERTS-data will be used for the study of more incompletely mapped recession lines of the last glaciation in southern Sweden.

For the study of the above mentioned moraine lines the MSS-5 band provides the most appropriate imagery.

ERTS IMAGE DESCRIPTOR FORM

(See Instructions on Back)

NDPF USE ONLY
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ID

DATE October 10th 1973

PRINCIPAL INVESTIGATOR Harald Svensson

GSFC FO 426

ORGANIZATION Department of Physical Geography,
University of Lund Sweden

PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS*			DESCRIPTORS
1043-09574-5				Terminal moraine
				Estuary (in a former ice margin)
				Fjord
				Lineament
				Fracture pattern
				Coast
-6				Lake
-7				Lake

*FOR DESCRIPTORS WHICH WILL OCCUR FREQUENTLY, WRITE THE DESCRIPTOR TERMS IN THESE COLUMN HEADING SPACES NOW AND USE A CHECK (✓) MARK IN THE APPROPRIATE PRODUCT ID LINES. (FOR OTHER DESCRIPTORS, WRITE THE TERM UNDER THE DESCRIPTORS COLUMN).

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